The JOHNSON NATIONAL DRILLERS JOURNAL

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GROUND WATER RESOURCES AND THEIR CONSERVATION

GROUND WATER PROVINCES OF THE UNITED STATES

(Continued)

Provinces G. H. and I

G—Wisconsin-Paleozoic Province.
H—Superior Drift-Crystalline Province.
and I—Dakota Drift-Cretaceous Province.

These three provinces are not as large in area as some of the others but they are interesting not only from the standpoint of geology but from the fact that they constitute the principal source of ground water supply for the area they cover.

Province G, known as the Wisconsin Paleozoic province, covers the southwest quarter of Wisconsin and a small area in the northwest corner of Illinois. Province H covers a large area in the northern part of Wisconsin and about two-thirds of the northern part of Minnesota. Province I covers the eastern half of North and South Dakota, the northwestern part of Iowa, and a narrow indentation in the east-central part of Nebraska extending to the Nebraska-Kansas border.

In Province G most ground water supplies are obtained from wells of moderate depth in the Cambrian or Ordovician sandstone or limestone. These wells as a rule yield ample supplies of hard but otherwise good water. In many of the valleys artesian flows are obtained from the Paleozoic aquifers. This area is devoid of glacial drift except in the valleys where there are water-bearing outwash gravels.

The impact of the defense program is felt more and more every day by all of us. New regulations covering the use and procurement of materials are being issued daily.

No one in business can afford to overlook these regulations as they not only have a bearing on the volume of business that can be done but also on the materials with which to do business.

Later on regulations based on essentiality of use will determine the distribution of available materials under a priority system similar to that used during World War II.

The conditions in Grant County in the southwestern corner of Wisconsin are typical of the "driftless area" in Province G. Here the underlying basal rock is Pre-Cambrian granite; above this are the Cambrian sandstones, known as the Potsdam formation. These sandstones are the most prolific aquifers in that section of the state, the water conditions being artesian in many places when overlain by younger formations and under water table conditions where the formation is at the surface. The lower Magnesian limestone overlies the Cambrian sandstones in many places and above this is the St. Peter sandstone and the Platteville limestone. Many of the river valleys are cut down below these formations draining them of any water they may contain, but wherever these formations outcrop, they can be developed for small water supplies. The deep cut valleys of the principal streams often contain heavy deposits of sand and gravel in which large supplies can be found. As a rule, the surface is entirely devoid of drift though it may be covered with thin deposits of loess. The St. Peter sandstone outcrops in the west and northwest furnishing access to large quantities of water which are found in deep wells further south in Wisconsin and the northern part of Illinois.

At LaCrosse, Wisconsin, which is in the heart of Province G, the basal rock is Pre-Cambrian granite with the upper Cambrian or Potsdam sandstone immediately above. The deeply dissected hills along the Mississippi River are mostly lower Magnesian limestone, with a loess covering from 5 to 10 feet thick. The principal aquifers are the Potsdam sandstone in the hill country and the alluvial sand and gravels in the main river valleys. A large part of the City of LaCrosse water supply and many of the large industrial supplies in LaCrosse are

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Geologic section, east and west, across northern Eau Claire County, Wisconsin. (Wisconsin Geological Survey Bulletin No. 35).

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obtained from the alluvial sands and gravels in the Mississippi River bottoms. The water is generally hard from both river and ground water sources, though the river water is much lower than ground water in hardness.

The City of Eau Claire, Wisconsin, is situated on terraces of sand and gravel at the junction of the Eau Claire and Chippewa rivers. The underlying Potsdam sandstone is exposed at many places along the rivers and in the hills back of the city. The city water supply is from relatively shallow wells in the sands and gravels near the Chippewa River. In Eau Claire County pre-Cambrian granite outcrops along the rivers and streams in the northeastern part, while the Potsdam sandstone outcrops over the balance of the county. Alluvial sand and gravel is quite general in the valleys of the Chippewa and Eau Claire Rivers and glacial drift is found in a thin sheet over all of the county, except the southwest corner. The principal water-bearing strata are in the upland sandstones and the sands and gravels in the river bottoms. Occasionally shale beds are found in the Potsdam sandstone but they are thin and yield no water; however, they may be heavy enough to shut off water from the lower portions of the formation.

Province H which is the northern one-third of Wisconsin and the northern two-thirds of Minnesota are similar in many respects. The area is known as the Superior Drift-Crystalline province and in most parts satisfactory supplies are obtained from the glacial drift. Where the drift is thin water supplies are generally scarce, because the crystalline pre-Cambrian rocks lying near the surface yield very little water if any. The interesting thing about this area is the absence of Paleozoic, Mesozoic, or Tertiary formations thick enough to yield satisfactory quantities of water. The drift and rock waters range from soft waters low in minerals in Wisconsin to highly mineralized waters, some of them unfit for use in the western and especially the northwestern part of the province.

In a large area in the northern and north-central parts of Wisconsin the pre-Cambrian rocks at the surface are covered by a thin sheet of glacial drift. Small domestic supplies are about all that can be obtained from these formations. Cambrian sandstones of Province G crop out to the east, south, and west of the exposed pre-Cambrian. To show how much the ground water conditions vary in this province, we notice that in Washburn County the glacial drift and alluvial sands and gravels are the principal formations appearing at the surface with only a few outcrops of the crystalline rocks appearing in the river bottoms. Many small well supplies from 50 to 100 feet deep are developed without striking the rock and at Spooner, Wisconsin, the sand and gravel is over 200 feet thick. By contrast the western part of Shawano County is underlain by the pre-Cambrian rocks covered with thin deposits of glacial drift. The part of the county east and south of the Wolf River shows the presence of Potsdam sandstone, lower Magnesium limestone, St. Peter sandstone, and Trenton limestone, all overlain by glacial drift of varying thickness.

A hydraulic drilling rig operated by Geo. Hutchinson & Co. Ltd. of Auckland, New Zealand. Their business covers all aspects of water supply engineering and servicing. This company recently drilled a special copper lined artesian well over 700 feet deep.

In Douglas County which lies near the center of the province and south of Lake Superior the principal underlying formation is the Keweenawan trap of pre-Cambrian age. The Lake Superior red sandstone forms a belt of variable width near the lake. The surface deposits which slope toward Lake Superior consist of alternating beds of clay, sand, and gravel which dip toward the lake. In the southern part of the county irregular deposits of glacial boulders, sand, and gravel predominate at the surface. The thickness of the formations vary considerably throughout the county. The granite and Keweenawan trap which underlie the Lake Superior sandstone are of great depth, as they were erupted many years ago from deep seated sources. At Superior the sandstone is probably between 5,000 and 10,000 feet thick thinning toward the trap. The glacial deposits over the trap and in the southern part of the county vary in depth from nothing to 200 feet. Under the St. Louis river there is an old buried valley filled with surface deposits almost 600 feet thick. The principal sources of water are the surface deposits of the glacial drift, though small amounts of water are in places obtained from the fractures of the trap formation.

In Minnesota the northwestern part of the state is in Province H with the only outcrops of pre-Cambrian rock occurring in seven counties. The balance of nineteen counties have no outcrops of rock and are covered with a variety of surface deposits. Paleozoic sediments have been found in western Kittson County above the crystalline rocks, but in most places in the area these rocks are capped by gritty clays formed by the decomposition of the underlying rock. The upper portion of these clays is often reddish or yellow in color

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with the lower portions nearly white. These clays are widespread beneath the glacial drift even where the Cretaceous beds are absent.

All of the northern part of Minnesota was covered one or more times by the ice sheets from Canada. The glacial drift is therefore the most important water-bearing formation in this area. Three types of glacial drift have been recognized, the "old gray" or Kansan which is widespread, the "young gray" and the "red" drift. The "red drift" is found over most of the northeastern part of the state while the "young gray" drift is found covering the area between the "red drift" on the east and the Red River Valley on the west. The drift deposits may also be divided into three types or classes: (1) till plains, (2) marginal moraines, and (3) outwash deposits.

To anyone familiar with the surface topography of Minnesota these classifications are easily recognized. The till plains are well known to drillers as they contain irregular pockets, streaks and lenses of sand and gravel called veins. Whenever these beds of sand and gravel are found they yield water readily though they may be local in nature and not dependable for heavy, continuous pumping. The marginal moraines are indicated by belts of low rounded hills, short ridges and depressions. Sand and gravel deposits also boulders are found in these morainal deposits. Lying around the moraines and covering large areas of the surface are the outwash deposits of sand and gravel deposited by glacial streams. These formations are recognized by smooth surfaces and light, sandy soil. Usually these deposits are saturated with water which conforms generally to lake or stream water levels. Many driven wells are put down for small supplies that range in depth from 10 to 50 feet.

Geologic section, north and south, across Douglas County, Wisconsin. (Wisconsin Geological Survey Bulletin No. 35).

The sediments deposited in glacial Lake Agassiz are recognized by ridges of sand washed up along the shore, sand plains near the shore, and silt deposits. Several sets of beach ridges were formed as the lake level lowered. Some of these deposits remain as sloping plains 5 to 10 miles wide and from 10 to 15 feet thick. The lower parts of the sandy lake beaches are saturated with water which may be developed from shallow wells. The silt deposits, however, are poor yielders and not a good source of water. For dependable supplies in this area water is developed from the underlying glacial drift when present.

Province I is known as Dakota Drift-Cretaceous province. It extends over the eastern half of North and South Dakota, a small area in the northwest corner of Iowa, and a narrow V-shaped strip in the east-central part of Nebraska. Two important sources of ground water are available in the area, the glacial drift and the Dakota sandstone. The drift supplies the majority of wells with hard but good water throughout the area. The Dakota sandstone is one of the best known aquifers in the United States being under artesian conditions in most places, thus supplying many high yielding wells, some of them flowing. The waters from the Dakota sandstone as a whole are good though highly mineralized in places.

In the eastern part of South Dakota there are very few outcrops of the underlying formations as the surface is covered with a deep mantle of glacial drift. The Missouri River has cut a deep valley exposing many of the older formations, some of them are Pierre shale. Below the great bend Niobrara chalk appears and is continuous as far as the mouth of the James River. At this point the shales of the Benton group appear and the Dakota sandstone finally outcrops in the southeast corner of the state near Sioux City, Iowa.

The pre-Cambrian crystalline rocks which underlie the Central Plains rise rapidly in the eastern part of South Dakota and finally outcrop near Mitchell eastward to the vicinity of Pipestone. In addition to the gradual rise of the "bed rock" surface to the east, there is a high underground ridge which extends through Salem and Mitchell toward Chamberlain. There is no indication of the ridge on the surface as it is buried under drift and sandstones. The younger formations abutting against this underground ridge indicate that it was a ridge of considerable height at the time the Dakota sandstones were deposited. The rock of this ridge is known as the Sioux quartzite. It outcrops over a large area along the Big Sioux River near

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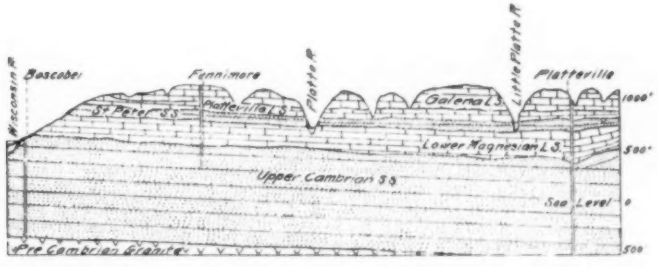

Geologic section across Grant County, Wisconsin from Boscobel to Platteville. (Wisconsin Geological Survey Bulletin No. 35).

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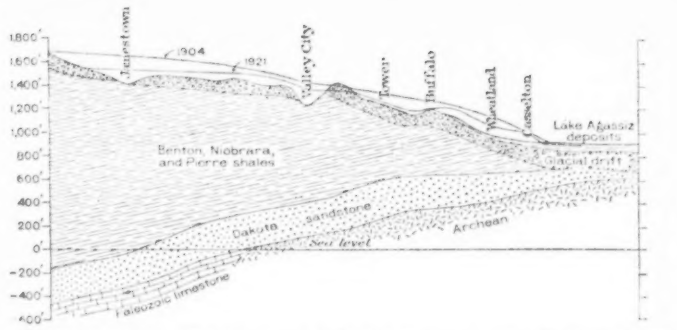
Sioux Falls and at other points to the west and northeast. It is composed of hard sand grains cemented with silica and quartz. It is usually very dense and hard with a pink to reddish color. At Sioux Falls it is over 500 feet thick. At Mitchell it is over 200 feet thick. It is not a source of water but is very well known in South Dakota for its extensive and picturesque outcrops and geological interest.



Section across the Dakota area of artesian flow along the Northern Pacific Railway, showing height to which the artesian water would rise about 1904 and 1921. (Water Supply Paper No. 598).

Although it is probable that the rocks of the Paleozoic system extend for some distance east from the Black Hills southward from Manitoba and northward from Nebraska, they are absent in South Dakota and in most of the area lying east of the Missouri River. The deeper wells in Pierre and Aberdeen found materials of Cretaceous age lying directly on the old crystalline rocks. South and east of these places the same conditions are found and on the underground ridge of the Mitchell region even the Dakota sandstone is missing. South of the ridge at Yankton and Elk Point the Dakota sandstone is underlain by the quartzite, while at Ponca, Nebraska, and Sioux City, Iowa, Paleozoic limestones are found.

To fully appreciate the importance of the Dakota sandstone one has to follow its boundaries and study its artesian possibilities and hydraulic characteristics. It is predominantly a soft sandstone, fine grained and light gray in color. At places there appear thin layers of shale and limestone but taken as a whole this formation is one of the largest and most dependable ground water reservoirs in the United States.

The Benton group of shales underlie nearly all of eastern South Dakota with the exceptions we have mentioned. Above these formations is the Niobrara formation which is mostly chalk grading into shale farther north. Some use is made of this rock for building purposes but is not a good water yielder. The Pierre shale where present is found above the Niobrara. This formation is really a heavy dark gray clay hardly sufficiently compacted to be a shale. It appears at the surface in many places. Throughout the eastern part of the state the Quaternary deposits mostly of glacial origin are found in several different forms, such as glacial sands and gravels, glacial till, and glacial moraines.

Naturally the most accessible water in eastern South Dakota is that found in the surface formations, such as the sands and gravel at the base of the glacial drift. The principal supply of this entire region is of course the Dakota sandstone which underlies most of the Great Plains.

In North Dakota ground water by popular classification falls into three groups. One group consists of the shallow surface waters used for home, farm, and village sup-

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Howard Gale of Shinglehouse, Pennsylvania, operates in both New York and Pennsylvania specializing in large diameter holes. In the picture he is drilling a well for Clark Bros., Inc, of Olean, New York. This is one of the Dresser Industries. The well is to be used for air conditioning. A 10-foot Johnson Screen produced over 400 g.p.m. with 4 feet of drawdown from a well 84 feet deep. Howard Gale is at the controls and Otis Stonemetz is the helper.

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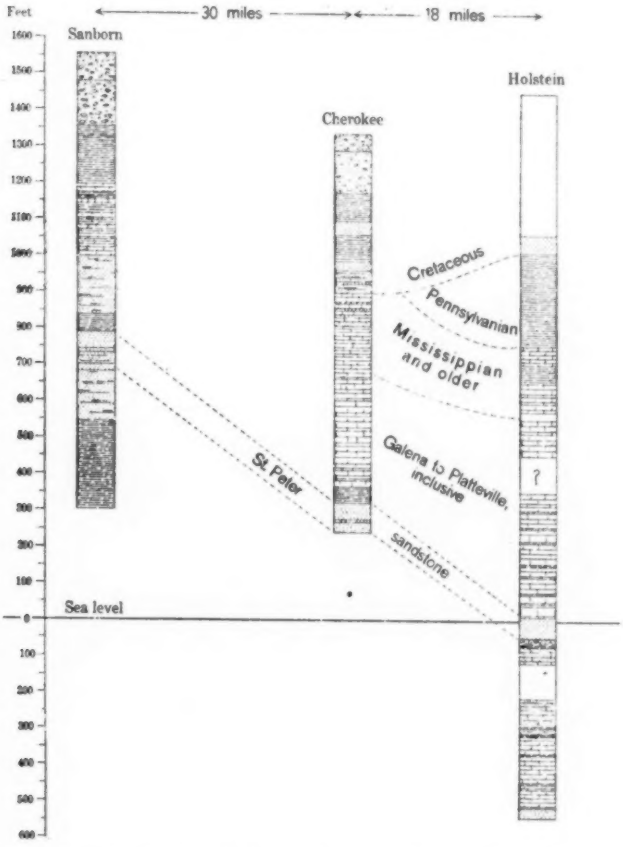
plies, generally found at 100 feet or less from the surface. These shallow supplies are oftentimes very low in yield and local in extent. The second group is composed of those waters found at depths from 100 to 500 feet and reached by drilled wells in porous layers found in shale, sandstone, or lignite formations. These supplies when found are often scanty and may have originated many miles from where they are found. The third group of waters is those found in the deep artesian beds. Many farms, cities, and industrial plants have drilled wells into these formations for adequate water supplies. The distinction between these groups of water is hard to define as the geology of North Dakota is complex and varies greatly from place to place.

As a whole the conditions in that portion of the state lying in Province I are similar to those in the eastern part of South Dakota. Simpson divided the area into the Red River Valley and the drift prairie. Though the word valley is used, the area lying west of the Red River is not a true river valley created by erosion, rather it is an ancient lake bottom. In places it is 35 to 40 miles wide rising about 200 feet in elevation from south to north. There are no outcrops of rock in the area and the surface is deeply covered with a fine silt overlying a heavy layer of glacial drift. This plain is actually the prehistoric bed of Lake Agassiz. During glacial time the entire plain was covered with a sheet of ice. As the ice melted and retreated across the high land that forms the Continental Divide between waters that flow north into Canada and those that flow south into the Gulf of Mexico, the melting waters were held between the highland divide on the south and the melting ice front on the north. This accumulated water formed what is now called glacial Lake Agassiz, even though the water disappeared thousands of years ago.



Geologic section between Sanborn and Holstein, Iowa. (Water Supply Paper 293).

The boundary between the Red River area and the Drift Prairie lying to the west is indicated by a rise of land 300 to 400 feet high. The south portion of this area is a sloping plain but the northern part is noted for sharp outstanding bluffs and is a rough rugged country. The glacial drift includes the deposits of two or more stages, the Wisconsin and at least one of pre-Wisconsin age. The drift consists chiefly of a compact clay through which are mixed sand, gravel, and boulders. Geologists say this material was partly brought in from Canada and partly of local origin. It varies in thickness over the area but is drawn upon heavily for farm and domestic wells. The till itself is impervious but the sand and gravel beds found in it are often under artesian head. Along the south and west sides of the moraines the plains are frequently underlain by gravel, sand, and silt which come down forming graceful slopes. These outwash deposits are often sources of water for shallow wells.

Not to be overlooked in North Dakota are the alluvial deposits found in practically all of the larger river valleys. The most extensive deposits are found along the Missouri, Little Missouri, Sheyenne, James, and Souris rivers. At Valley City the Sheyenne river valley contains deep wide deposits of coarse glacial gravel which furnish large supplies of usable water. Owing to the difficulty of distinguish-

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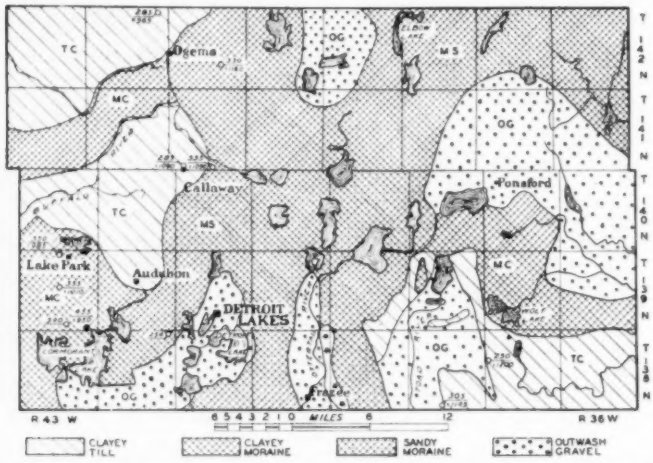

Map showing the surface formations of Becker County, Minnesota. These conditions are typical of a number of counties in this section of the state. (Minnesota Geological Survey Bulletin No. 22).

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ing between glacial debris and more recent alluvial deposits they are often confused. The valley alluvium, however, may contain mud and fine sand which make these formations uncertain as to yield and quality. It is usually desirable to go to the deeper underlying glacial sands and gravels for satisfactory supplies.

In Iowa the area covered by Province I is all in the western part of the state being about four counties in width at the northern border and gradually becoming more narrow until it is only two counties in width at the southern border. The area is referred to in W.S.P. 293 as the Northwest district. Over this area the heavy mantle of drift has been cut through by stream erosion in a few places but there are very few outcrops of rock. Below the clays and the sands of the drift the shales and soft sandstones of the Cretaceous are found resting on the older formations. In the extreme northwestern part of the state the Sioux quartzite outcrops. It sinks steeply to the south and east. Deep wells at Sanborn, Cherokee and Holstein indicate that supplies sufficient for municipal use can be found in the Ordovician and Cambrian sandstones (Jordan, New Richmond, St. Peter). At Holstein a drill hole 550 feet below the top of the St. Peter sandstone showed about 200 feet of Prairie du Chien dolomite underlain by 250 feet of the St. Lawrence formation and 35 feet of sandstone referable to the Dresbach. The formations above the St. Peter, the Decorah shale and Plattesville limestone are found under the eastern part of the area as far east as Cherokee. The formations contain artesian water in other parts of Iowa but not in this area. As a whole the conditions found in Buena Vista County are typical of the region, the water supplies being drawn from alluvial deposits in the valley of the Little Sioux River, the sand deposits found in the glacial drift and the underlying Cretaceous sandstone (Dakota). Beneath these formations are the older and deeper deposits.

The portion of Province I in Nebraska varies somewhat in geology from that immediately east in Iowa. The principal formations are all of sedimentary origin, the lowest exposed being clay, chalk, limestone, and sandstone of Cretaceous age. From records of deep drilling it is known that Carboniferous limestones also underlie part of the region. As a rule sheets of sand and clay topped by loess form the surface deposits. Starting with the Dakota sandstone underlying the area the upper formations are usually the Benton shales and limestone. These are known as Graneros shale, Greenhorn limestone and Carlisle shale. Above this formation is the Niobrara lying between the Carlisle and Pierre shales. In places there are stratified sands and clays of the Arikaree formation and above these the glacial drift, loess and alluvium of Recent time.

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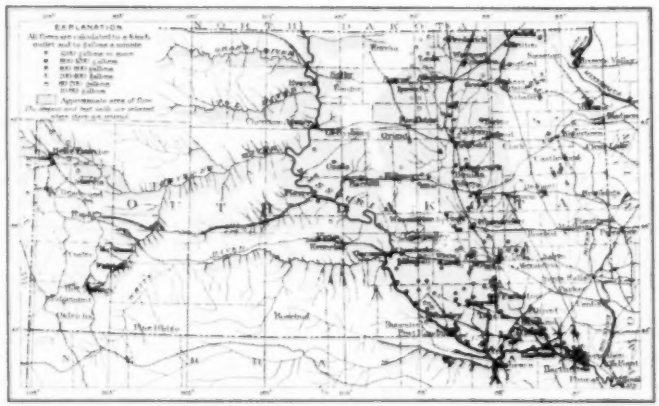

South Dakota artesian area showing relative volumes of flows from wells. (Water Supply Paper 227-1909).

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As a whole the part of Nebraska in Province I is not as well provided with water-bearing formations as the balance of the state. There is no shortage, however, and supplies are sufficient for present farm, domestic, industrial and municipal use. The area extends southward as far as Lincoln and into some counties southeast of Lincoln. In Lancaster County where Lincoln is located, the surface formations are glacial drift with the Dakota sandstone underneath at relatively shallow depths. Water is easily obtained from both formations. Immediately below the Dakotas are Carboniferous limestones which contain highly saline water under artesian head. For many years a "salt" well flowed in the Post Office square of Lincoln. This salt water finally worked into the upper fresh water aquifers and indirectly resulted in the City of Lincoln abandoning its original well supply for one over 30 miles away in the sands and gravels of the Platte River Valley at Ashland, Nebraska.

—o—

WATER CODE PROPOSED FOR IDAHO

The constitution of Idaho declares the right to divert and appropriate the unappropriated waters of any natural stream to beneficial uses shall never be denied, except that the State may regulate and limit the use thereof for power purposes.

A bill for the purpose of regulating the use of ground water was first introduced into the Idaho legislature in 1945. This bill was patterned after a Utah regulation. During January of this year a bill to regulate the use of ground or subterranean water was proposed which is similar to a bill introduced in 1949. Under the proposed legislation the appropriation of ground waters is restricted to permits and licenses in the same manner as surface water is now appropriated.

Permits would be granted by the State Engineer after application and the rights of wells in existence would be considered in granting any appropriations under the proposed law. In cases of dispute means are provided for appeal to the District and Supreme Court of Idaho.

J. C. Funkhouser using modern drilling equipment to replace the water supply at the historic house of Judge Berrien at Rocky Hill, New Jersey. This house was Washington's headquarters at one time and it is said he wrote his farewell address to his troops while occupying this house.

It has been estimated that about 200,000 acres of land not now under irrigation can be developed by wells and pumping with reasonable pumping lifts. The State Reclamation Engineer will be the person accepting applications and acting on appropriations.

—o—

"Boss, may I have next Wednesday off?"

"I don't think so."

"But it's my silver wedding anniversary and my wife and I had hoped to celebrate.' '

"For heaven's sake! Am I going to have to put up with this every 25 years?"

We have been informed of the death of Herbert Nystrom, an old time driller, at Mason, Wisconsin. Mr. Nystrom started drilling in 1915 and even though he lost one hand on account of an accident he continued drilling. He was the father of ten children at the time of his death which was due to being struck by lightning on October 16, 1950.

Husband (struggling with budget, to wife) — "We should have saved during the depression so we could live through this prosperity."

—Christian Science Monitor.

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TOM'S COLUMN

Dear Fellows:

Well sir, I been through some tough spring breakups in my time, but I aint never seen anything to beat the roads in these parts this spring. Maybe the reason I'm all riled up about it right now is because we just hauled the rig over a stretch of chuck holes and frost boils that makes them air raid pictures look like smooth sailin'. We managed to break a spring and knocked the steerin' gear crookeder than a corkscrew in a dry county. I s'pose we oughta be glad to get by that easy though because some of them holes was murder and if it would have been night drivin' we mighta 've been flounderin' in some ditch on a lonely road.

In the sections where the snow has been heavy this winter it came early in most places before the frost had a chance to bite very deep, so maybe the benefits will show up in the ground water levels. From the looks of things there's been a lot goin' on even if bad winter conditions held up a good deal of work in many parts of the country. I've been readin' about state driller meetin's and the attendance was unusually good. That's a sign that a lot of drillers are takin' the work serious. Guess it's clear enough to anybody who's tryin' to stay in business in these times that the old easy goin' ways won't work no more. Some of us old timers find it hard to face up to new conditions but its better fer everybody in the long run. Fer one thing, more people are learnin' that the business of water development is so important that every other business has to start from there. They're teachin' such things in the colleges now, 'specially the theoretical stuff, but they're also findin' out that the things they learn in school aint enough. Not by a long shot. It takes the practical work full of the hundred an' one bumps and problems that drillers meet in actual drillin' to round out a real understandin' of how to get a dependable water supply. A driller that's messed around with a variety of ground formations can stump a lot of the scientific gents who are fairly drippin' with hifalutin' degrees. Education is a fine thing, but in this game its gotta be tied up with a practical understandin' of how to deal with the strange quirks of nature you find underground. That is, if you want to get water. It took some of us years to get the hang of it. Maybe a good school trainin' would have got us into the groove in less time, but they all learn that it takes more than a engraved diploma to make a well produce. Put both the schoolin' and the experience together and you got a great combination.

While most drillers are kinda proud to have this business recognized by these institutions of higher learnin', it takes you down a notch when you figger all the peo-

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Nebraska
H. O. Parkert, President ..... Hooper
Vincent H. Dreeszen, Secretary U. of N., Lincoln

Nevada
S. R. McKinney, President ..... Las Vegas
William Wright, Vice-President ..... Dyer

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P. Y. Bainbridge, Secy.-Treas. ..... Guilford

North Dakota
Alfred Jaeger, President ..... Mooreton
Fred V. Sletvold, Sec'y-Treas. ..... Oakes

Northwest
M. West, President ..... Salem, Oregon
Frank Gaut, Secretary ..... Beaverton, Oregon

Ohio
L. P. Cranz, President ..... Ira
E. D. Allen, Sec'y-Treas. ..... Steubenville

Oklahoma
R. D. Sawyer, President ..... Chickasha
L. J. Clarke ..... Oklahoma City

Oregon
Ed Steinman, President ..... Portland
Art Grant, Secretary ..... Aloha

Pennsylvania
EASTERN DIVISION
John H. Rulon, President ..... Philadelphia
Thomas Magee, Secretary ..... Philadelphia 25
WESTERN DIVISION
G. W. Walters, President ..... Rimersburg
Mrs. Merle Butcher, Secretary ..... Washington

Rhode Island
D. O. Hamilton, President ..... Portsmouth
D. E. Whelan, Secretary ..... Providence

South Dakota
Roy Magnus, President ..... Webster
Harold Horbeck, Secretary ..... Redfield

San Joaquin Valley (California)
Jack De LaGrange, President ..... Madera
Glen V. Slater, Secretary-Treasurer ..... Fresno

Texas
O. F. Jensen, President ..... Houston
Geo. Ringstaff, Secy.-Treas. ..... Houston

Virginia
W. C. Falwell, President ..... Lynchburg
Jack Sundquist, Secretary ..... Norfolk

Washington State
Oliver F. Zinkgraf, President ..... Spokane
O. E. Erdman, Sec'y-Treas. ..... Elma

Wisconsin
George Galloway, President ..... Milwaukee
Ralph H. Nienow, Executive Secretary ..... Merrill

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ple who still seem to think drillin' is a simple game that anybody can play. Once in a while you meet fellows who figger it's an easy way to pick up some profits. One of them put it up to us last week. He was lookin' around fer a chance to pick up a rig cheap. He'd never done any drillin'. His idea was to raise a few hundred bucks fer a down payment on a rig—an' then pick up some drillin' jobs durin' certain seasons of the year. We asked him how he'd go about usin' a rig if he had one. Well, he allowed as how he was pretty handy with tools and equipment an' felt pretty sure he could make some money if drillin' paid as much per foot as he'd heard it did. Matter of fact he said he'd be satisfied with a lower rate once he'd got the outfit paid for. He said he wasn't tryin' to get rich on it, just wanted to pick up some steady money fer about six months out of a year. He told us he'd been watchin' some drillin' operations and felt sure he could handle a job. He didn't have no idea of what a good rig actually costs an' he sure knew nothing of the hazards of the business. Y'know he admitted that he was thinkin' he could get directions fer drillin' by just sendin' away fer some pamphlets—just like gettin' hold of a seed catalogue if you was goin' to plant gladiolos.

Now it aint surprisin' that a lot of people don't know anything about proper well drillin'. Chances are a lot of us drillers don't know much about a good many other important occupations. What gets your goat is that anybody thinks that this business of well drillin' and water supply production is so durn simple that any yokel can turn to it fer his spare time. Many a good driller who's gone bust could give a guy like that some fatherly advice.

There don't seem to be any good news comin' along about materials and supplies. They sure are crackin' down on copper and the outlook fer other ferrous metals aint gettin' any brighter. It's gettin' back to the old story—just keep in touch with your suppliers an' keep your eye on the reports from these control guys in Washington. It's one of them years that'll call for careful plannin' and good management. Some of the boys are sayin' it might grow worse before it gets better. It's a cock-eyed world, aint it, but I reckon it's the best we got till something better shows up.

Well, gotta be shovin' along—wish you all best of luck.

Yours truly,

TOM.

Hilmer Davidson drilling a farm well near Grygla, Minnesota. This was only one of more than 20 wells drilled by Mr. Davidson in the same community.

—o—

"You say this woman shot her husband with this pistol, and at close range?" asked the coroner of the eye witness to a colored tragedy.

"Yassuh," replied the witness.

"Are these powder marks on his body?"

"Yassuh, das why she shot him."

Fatal typographical error: Telegram to wife at home from vacationing husband: "Having a wonderful time; wish you were her."

Mother — "Son, when that naughty boy threw stones at you, why didn't you come and tell me instead of throwing them back at him?"

Johnny: "Aw, gee, Mom, what good would that do? You can't hit the side of a barn."

D-O RATINGS AVAILABLE

For some time the National Production Authority (NPA) has been issuing defense orders to suppliers of material for the defense and atomic energy programs. By means of these orders these agencies were able to give a priority rating to their orders for material.

February 27, 1951, the National Production Authority set up Regulation 4 providing priorities for maintenance, operating and repair (MRO) supplies needed by all manufacturing, distributing, and service enterprises. Under this regulation all businesses, farms, schools, hospitals, etc., are authorized to place a Defense Order 97 priority rating on their orders for MRO items.

For well drillers, this means they can apply the rating for such maintenance, operating, and supplies needed to keep their equipment in good shape. By the same token the order also applies to their customers who need well screens to keep their water supplies in operation. The DO-97 rating has the same value as the DO ratings previously used on military and defense orders and suppliers must give it the same priority as defense orders. This means that an order carrying the DO rating takes precedence over an order without such a rating. However, there is nothing in the order that guarantees the delivery of material.

Furthermore, the DO-97 certificate on MRO orders can only be used on orders up to an amount equal to the total dollar value of similar MRO items used by you during any quarter in 1950. The quarterly dollar quota of the person using a DO-97 certification is either (1) one-fourth of his yearly consumption for 1950, or (2) his consumption in the same quarter of his base period. However, orders may be placed up to $1,000.00 per quarter regardless of the amount of such materials used in 1950.

To take advantage of the rating simply write "DO-97 certified under NPA regulation No. 4," on your MRO orders. If such purchases were more than $1,000.00 a quarter in 1950 or your base period you must write the NPA stating what your quarterly quota is and how you arrived at it.

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SURFACE and GROUND WATER CONDITIONS

The January, 1951, Water Resources Review by the U. S. Geological Survey reported the drought in the Southwest continues with the area of deficient runoff increasing in the upper Colorado River Basin. Runoff and ground water levels were at a record low for the month at several stations.

Streamflow was generally excessive in the Northwest and in the Ohio River valley with floods occurring in the smaller streams of western Kentucky. Runoff and ground water levels were well below normal along most of the South Atlantic slope and Gulf of Mexico. Drought conditions were reported in southern Texas.

In Idaho runoff and ground water levels were above average. The average decline of ground water levels in Buffalo Rapids Irrigation Project on the Yellowstone River and in Helena and Townsend valleys ranged from 0.3 to 0.7 feet. In Wyoming ground water levels were generally above normal, while in Colorado they were near or below normal. Utah ground water levels in the southeastern part were generally high. In Nevada at Reno observation wells showed ground water levels were at a record high. Ground water levels in the heavily pumped Tucson area continued the record breaking low trend that has persisted since October, 1950. In New Mexico the water table reached record low levels for January in most areas where ground water is pumped for irrigation.

In the central plains part of the county both ground water levels and stream flow were high in central and southwestern Kansas. Water level in the key observation well near Garden City was a record high for January continuing the series of record breaking levels that has persisted since October. Ground water levels were higher at places in Nebraska.

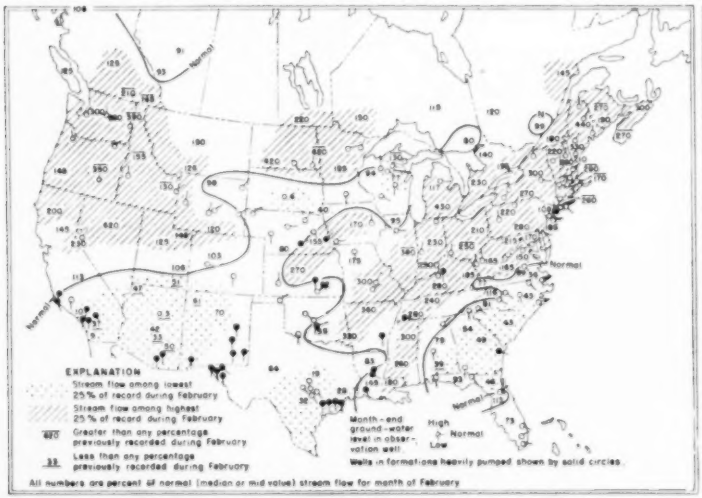
In the Great Lakes area ground water levels in Wisconsin were generally low, also in the southeast section in North Carolina declines were noted.

In February ground water levels were reported excessive from eastern Canada to the Ohio Basin. At the same time drought conditions and deficient runoff and ground water levels occurred in Texas and the southeastern states.

In the mid-continent area levels remained high in North Dakota and in a key observation well at Marion, Iowa. In southern Missouri levels were generally above normal, though deficiencies in ground water levels were noted over most of Texas. In the Ohio Basin levels remained high, Kentucky and Indiana reporting record highs. The same conditions were found in West Virginia and in Ohio runoff and ground water levels remained high for the sixth consecutive month.

In the southeast the situation in February remained about the same with higher levels reported in North Carolina and lower levels in South Carolina, Alabama, Georgia, and Florida.

In New York ground water levels continued generally above normal in upstate areas. Stream flow was well above normal for the fourth consecutive month. New York City reservoirs were full and overflowing.


Normal
EXPLANATION
Stream flow among lowest 25% of record during February
Stream flow among highest 25% of record during February
Greater than any percentage previously recorded during February
Less than any percentage previously recorded during February
Month-end ground-water level in observation well
High
Normal
Low
Wells in formations heavily pumped shown by solid circles.
All numbers are percent of normal (median or mid value) stream flow for month of February

STREAM FLOW AND GROUND WATER IN RELATION TO NORMAL, FEBRUARY 1951

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DO RATINGS AVAILABLE

(Continued from Page 9)

Maintenance supplies are defined in the order as those necessary "to continue any plant, facility or equipment in sound working condition." Repair means "the restoration of any plant, facility, or equipment to sound working condition when it has been rendered unsafe or unfit for service by wear and tear damage, failure of parts, and the like." Operating supplies are "any materials which are normally carried as operating supplies . . . materials incorporated in a product ordinarily may not be treated by the producer as operating supplies."

The order also provides for procuring minor items of capital equipment where the total cost of material does not exceed $750.00. Such items are then charged against your MRO quota.

The same general plan of priority ratings will be carried out when the controlled materials plan (CMP) goes into effect July 1, 1951, as it is realized provision must be made to keep the wheels of industry, commerce, and essential businesses turning.

Since this order has been in effect, Edward E. Johnson, Inc., has been asking our driller and jobber customers to obtain DO-97 certificates on their screen orders whenever applicable, in order that we can take advantage of the rating on our orders to our suppliers. We ask every one ordering a screen to have this order in mind and use it

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whenever possible. The certificate must be signed by the user of the goods. This means that neither the jobber nor the driller can sign a certificate for their customer. The customer or user must sign the certificate himself and give it to the person supplying him with the screen. This person whether a well driller or a jobber then sends the certificate to us with his order.

It should be understood that the DO-97 rating applies only to those items coming within the definitions contained in the order. It does not apply to the improvement of any plant or equipment by replacing sound workable equipment or material with new or different machines, parts or gadgets.

The certification required on MRO orders is "DO-97, certified under NPA Regulation 4." The signature must be that of the user of the goods or material covered by the certificate. For example, a farm well breaks down and needs repairs or replacements. The farmer may now certify that these materials are necessary to repair the well by simply signing a certificate as worded above. If it is a well driller who will supply the service or materials he passes the certificate on to his supplier whether manufacturer or jobber. The manufacturer or jobber receiving such a rated order must fill it ahead of any non-rated orders if he has the goods or materials available.

—o—

Maizie—"I have a very jealous husband."

Daisy—"What has he done now?"

Maizie—"I gave him some underwear for his birthday and he has been trying ever since to find out whose initials are B. V. D."

America—The land where in one generation a family can rise from a plain cabin to a cabin plane.

Pacific Water Wells, Inc., Victoria, B. C. installing a 20-inch Johnson Everdur Screen for the H. R. MacMillan Export Company, Pulp Division on Vancouver Island under the supervision of H. A. Simons, Consulting Engineer.

ASSOCIATION NEWS

This section is devoted to the exclusive use of water well drillers' associations, both state and local. Notices, announcements, changes of officers and other items should be sent to The Editor, Johnson National Drillers' Journal, 2304 Long Ave., St. Paul, Minnesota.

FLORIDA MEETING

Members and guests of the Florida Association met in Tampa, Saturday, January 6. Various reports of interest to the group were made and discussed. During the meeting it was decided not to hold the annual meeting in 1951 provided the national meeting was held in Florida. Mr. J. P. Carroll of West Palm Beach is President and Mr. R. M. Vickers of Miami is Secretary of this association. The next meeting will be in April and will be in Orlando.

SOUTH DAKOTA MEETING

A group of thirty well drillers met in Huron, South Dakota, on March 2 and 3 to hold the first annual meeting of this recently formed association. A sudden storm reduced the attendance somewhat but not the enthusiasm of the meeting.

Mr. Bruno Petch, Assistant State Geologist, discussed the geology of the Great Plains. Mr. Fred Beerman, Assistant State Engineer, spoke on "Water Conservation." Reports were heard from the Legislative Committee, Mr. Frank Schultz, Chairman, also the Secretary and Treasurer. The principal entertainment feature in the ballroom of the Marvin Hughitt Hotel was declared the best ever held in Huron. The officers for 1951 are: Roy Magnus, President, Webster; Keith Osberg, Vice-President, Huron; Harold P. Norbeck, Secretary, Redfield; and Ray Connor, Treasurer, Artesian. The next annual meeting will be held in Huron about February 1, 1952.

OREGON MEETING

This association held its first annual meeting at Portland, December 1 in the Multnomah Hotel. A number of new members were taken in at the meeting. Talks were made by representatives of the U. S. Geological Survey, the State Board of Health, and the State Department of Geology.

The following officers were elected for 1951: Ed Steinman, President, Portland; Ed Jannsen, Vice-President, Reedsville; and Art

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Grant, Secretary, Aloha. It was decided to hold another meeting at Eugene on March 31 with the Secretary in charge of details.

NEBRASKA MEETING

The 20th annual convention and short course of the Nebraska Association was held in Lincoln on February 22 and 23 at the University Campus with an attendance of 146 members and representatives of 48 firms with 27 having displays.

This group is noted for the quality and quantity of its meetings. This year was no exception. During the meeting the Lincoln Chamber of Commerce entertained the group at luncheon, with the usual Dutch Lunch furnished by jobbers and manufacturers at the Lincoln Hotel. The Chancellor of the University of Nebraska, Mr. R. G. Gustavson, spoke on the "Role of Water;" Dr. Condra, Dean of the Conservation and Survey Division of the University, spoke on "Fitting Into the Future Picture." Two excellent addresses with a musical program and song fest made this an evening to be remembered.

Dates for the 1952 convention are February 21 and 22 and efforts will be made to secure more room for these meetings. Mr. Vincent H. Dreeszen, c/o University of Nebraska, is Secretary of the association.

WISCONSIN MEETING

The 1951 convention of this association is going ahead. The meeting will be held at Green Bay on April 19 and 20. The association has introduced a bill in the Wisconsin legislature providing for exemption of all trucking of well drillers' supplies and materials from the ton-mile tax. In order to secure passage of this bill, all drillers are being urged to support it, by writing their assemblyman to vote "yes" on bill 359-S.

Mr. R. H. Nienow, Secretary, of Merrill, can supply information regarding the legislation.

IOWA MEETING

The Iowa Association held its 22nd annual meeting as scheduled at the Hotel Fort Des Moines in Des Moines January 25 and 26. The meeting was well attended by drillers, their wives, and manufacturers.

The speakers addressing the group were: Dr. H. G. Hershey, State Geologist; E. L. Ziemer, Secretary, Iowa Natural Resources Council; R. M. Jeffords, U. S. Geological Survey, and others.

A group of drillers viewing the outdoor exhibits at the Kansas Water Well Drillers Convention held at Great Bend in October, 1950.

A banquet on the evening of January 26 ended one of the most enjoyable meetings of recent years. During the business meetings the present officers were re-elected to serve for 1951.

COLORADO MEETING

The Sanitary Well Code Committee has held several meetings with representatives of the Colorado State and Federal Public Health Departments in an effort to formulate proposed legislation. The association contemplates a meeting in the near future to present the results to the membership as a whole, but a definite date has not been set.

The proposed legislation has taken the form of enabling legislation which will permit the State Department of Health to issue rules and regulations governing the construction of wells and provides for the licensing of well drillers under a bonding provision.

PENNSYLVANIA MEETING

A joint meeting of the eastern and western sections of the Pennsylvania Association was held at the Green Gables Hotel, Lewiston, Pennsylvania, on January 20. The meeting was conducted by the state president, Mr. J. V. Boehm.

The group was addressed by Mr. Fred Spang on the "Importance of Organization in the Era of Confusion." Colored pictures of petroleum operations in the Gulf of Mexico as well as hunting and fishing in Alaska were shown as an added attraction. Dr. Graham of the U. S. Geological Survey discussed pending legislation as it affected licensing of well drillers.

The next meeting was held by the eastern section in Lancaster February 24. Fifty members were in attendance at this meeting. Mr. Parker of Philadelphia entertained the group with pictures of "Cave Formations" and a discussion of snails, clams, and fossils.

At the business meeting the following officers were elected for the eastern section to serve from April 1, 1951: John H. Rulon, President, and Paul Myers, Vice-President, with nine directors.

The next meeting was a two-day joint meeting held at the Green Gables Hotel in Lewiston. It was highlighted by displays of well drilling equipment, pumps, etc., and a good program and entertainment for the evening of March 30.

EMPIRE STATE MEETING

The Empire State Association held its spring meeting at the Nelson House in Poughkeepsie, New York. Various questions of importance to the drilling industry in New York State were discussed. The meeting closed with a dinner meeting at 7:00 p.m. Mr. Robert E. Klindt, Morris, New York, is Secretary of the Association.

MICHIGAN MEETING

Preliminary plans are underway for the 23rd annual meeting of the Michigan Association to be held at

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Lansing, June 22 and 23, in the U. S. Armory Building. Details may be secured by writing Mr. Harold Armstrong, Secretary and Convention Chairman, 484 Capital Avenue S.W., Battle Creek, Michigan.

OHIO MEETING

A meeting of the Ohio Well Drillers Association was held March 3 at the plant of F. E. Myers & Bro. Company in Ashland, Ohio. An interesting program was presented which included a tour of the plant and a lunch furnished by the company.

WASHINGTON MEETING

This association held its fifth annual meeting in Seattle at the New Armory Building in November, 1950. The first regional meeting was held at Moses Lake, March 17. Other meetings during the year will be held at Walla Walla in July and the next annual meeting at Tacoma in November, 1952. Oliver Zinkgraf of Spokane is President and O. E. Erdman, Elma, Secretary and Treasurer.

MISSOURI MEETING

This association will hold its 15th annual meeting in Sedalia April 16 and 17 at the Hotel Bothwell. Outdoor space will be available for the display of drilling equipment. Space will be available in the hotel for smaller exhibits or displays.

A business meeting will be held the first morning, followed by a program in the afternoon. A banquet will be held that night. The program on Tuesday will be confined to the morning session with ample time allowed to take down the displays the same day. Further details regarding this meeting can be obtained from Mr. Dale L. Fuller, Service Secretary, Box 250, Rolla, Missouri.

MINNESOTA MEETING

More than 100 drillers and contractors, out of a total registration of 175 persons, attended the very successful 29th annual convention of the Minnesota well drillers. The attendance would have been even larger but for the weather.

The meeting was held March 8, 9, and 10 at the Hotel Nicollet in Minneapolis. The first day's session included a word of welcome from Mayor Hoyer of Minneapolis, followed by an exceptionally helpful and informative talk by Mr. Arthur Upgren, Associate Editor, Minneapolis Star and Tribune, on "Economic Facts and Inflation." Mr. Keith Brown, long-time drilling contractor and present mayor of Fairmont, Minnesota, gave an interesting discussion of "The History of Well Drilling in the Northwest."

Mr. E. W. Bennison of Edward E. Johnson, Inc., started off the second day's program with "Plain Talk About Water and Drillers." Mr. O. M. Kent, representing Region 8 office of the National Production Authority, then discussed the effect of NPA orders on availability of materials and how a recent order would operate to permit farmers and businessmen to use priority rating DO-97 to get needed maintenance, repair, and operating materials. Mr. Lloyd Oliver, president of the NWWA, followed with a talk on the objectives of that organization.

The remainder of the program included a helpful discussion on "Things We Should Know About Insurance" by Mr. E. E. Turnblom of Hardware Mutuals, an explanation of the "Co-Operative Work of the U.S.G.S. on Ground Water Surveys" by Mr. Robert Schneider of the U.S.G.S. now working in Minnesota, and a round-table discussion of contract and cost forms and accounting problems.

There were twenty-two exhibitors at the convention with interesting displays of materials and equipment.

The business sessions of the association were held on March 10. An important feature was the adoption of a new constitution and by-laws. The organization is now officially named The Minnesota Water Well Contractors' Association. The legislative committee reported on the progress of the proposed well drillers' registration act which is before the state legislature and there was considerable discussion on effective means of getting support to insure passage of the act.

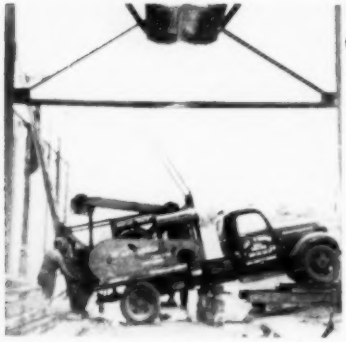
The present officers were re-elected to serve another year and include John S. Hoge, St. Paul, President; M. P. Christenson, Pengilly, Vice-President; Al. Zuercher, St. Paul, Secretary - Treasurer; Norm Ovrom, Executive Secretary. The Board of Directors for the coming year consists of Harold Bemis, Waterville; Tom Renner, St. Louis Park; Tony Martell, Somerset; Mike Ice, Wayzata; Algot Johnson, Parkville, and A. E. Mueller, Gaylord.

Following the business session the annual banquet was held which included an enjoyable program of entertainment.

INDIANA MEETING

Plans are being completed for the meeting of this association in Indianapolis on April 24, 25, and 26 the The Anthenaeum.

Second annual convention of Oklahoma Drillers Association held at the University of Oklahoma, Norman, Nov. 24, 25, 1950.



Mr. Art Vinson has to operate his rig in the position shown above in order to repair a well outside the building of the Certain-teed Products Company of Fort Dodge, Iowa. Mr. Vinson is active in the affairs of the Iowa Drillers Association having served as President for two years.

ADVERTISEMENTS

We will insert advertisements for drilling equipment wanted or for sale, help or work wanted, etc., for our readers, free of charge. Advertisements must be brief, and we cannot assume responsibility for them, but will be glad to put parties in touch with each other by this means and suggest that they investigate any offers or inquiries carefully for themselves.

FOR SALE: One Keystone Model 50 Spudder, telescope mast; pipe braces, stem guide, power hoist on derrick; machine used very little in A-1 shape. Mounted on 1½-ton International truck; price without tools or cables; $3,900.00. Write: Joseph Kopyar, Jr., R.F.D.4, 119 Trafford Road, Binghamton, New York.

FOR SALE: One 12-inch Worthington deep well turbine pump, 50' of 6" column with shafting, for 600 g.p.m. 125' head, with 25 h.p. vertical motor. Write: Monarch Marking System Company, Dayton 3, Ohio, attention of Mr. Richard C. Kelly, Purchasing Agent.

FOR SALE: All steel rig, semi-mounted on Model A truck; 32 ft. tower and 4 cylinder LeRoi motor; some tools; will sell for $1,100.00 or trade in on a larger rig. Write: Sydney Christenson, Route 1, Box 117, Cromwell, Minnesota.

FOR SALE: Well drilling machine, 1 year old, 20W Bucyrus-Erie, mounted on Dodge truck with tools. Write: Harry Champeau, 1231 Shawano Avenue, Green Bay, Wisconsin or Phone H-4158.

FOR SALE: One 21W Bucyrus-Erie drilling rig, trailer mounted, less tools, 2 years old with extra motor-rig used very little; one 20W Bucyrus-Erie, truck mounted, less tools, 1 year old and used very little; one 35 Cyclone used only on one job, complete with drill rods. Write: C. L. Jennings, New London, Iowa.

FOR SALE: One 71 Star all steel spudder equipped with International gasoline engine and drilling tools, from 10" down to 4" hole; including 1000 ft. ¾" drilling line and 600 feet sand line; all in good condition; approximately 350 ft. of 6¼" I.D. casing 17 pound and 150 feet 8⅝" 24 pound casing. A bargain at $2,500.00. Write: H. & E. Drilling Company, 3232 Piatt, Mattoon, Illinois.

FOR SALE: Sparta No. 10 drilling machine equipped with Allis Chalmers 4 cylinder motor; machine has trailer on rear end for semi-mounting on truck; this machine is in good running order; also a Sparta No. 30 machine, not in running order but can be bought very reasonably. Write: Chris Brunner, Sr., Stetsonville, Wis.

FOR SALE: Miscellaneous drilling tools and copper pipe; jars, bits, joints, drive clamps, bailers, etc. Write: Stirl F. Dysart, Route 4, Lincolnton, North Carolina.

FOR SALE: Complete drilling business consisting of three all steel drilling machines—two truck mounted and one unmounted; drilling tools from 5" to 15"; fishing tools, test pump and pump equipment; must be seen to be appreciated; will also sell all new resident buildings. Write: Box 278, Winnebago, Illinois.

WANTED: One 33-W Armstrong drilling machine. Write: C. F. Simpson & Son, 1000 S. Cedar Street, Nevada, Missouri.

WANTED TO BUY: Drill stem 14 to 18 feet long with 2x3x8 thread joint 3½ inch diameter or the complete string of tools with a stem of this size, or can also use a 4-inch stem 2x3x8 thread. Write: Adolph Rude, Flandreau, South Dakota.

FOR SALE: One truck-mounted 1,000-ft. capacity ELI built rotary complete with water truck and all tools; A-1 condition throughout; sold with or without 1,400 feet new and used 4½" casing. Call 1450 Lewistown, Montana or write P. O. Box 37, Lewistown, Montana.

FOR SALE: Deep well pumps, used; one size 6SC, with 7½ h.p. motor, 75 g.p.m. 195' head; one size 8MC, with 20 h.p. motor, 200 g.p.m. 258' head; one size 8MC, with 25 h.p. motor, 300 g.p.m. 215' head; some parts needed to complete all of these pumps; subject to prior use and sale; no warranty whatever; available for inspection. Write: The Sherwin-Williams Company, Linseed Oil Mill, Cleveland, Ohio.

FOR SALE: One set of Peerless slightly used turbine pump bowls for 8" column 1,000 g.p.m. 90 ft. head, 12"; one set of Worthington unused turbine pump bowls for 10" size; one Peerless flat belt head 25 H.P. 1" shaft. Write: American Drilling Company, 907 River Road, Fair Haven, New Jersey.

FOR SALE: Failing double drum drill, Model 1000, complete, tools, drill pipe, etc., now operating near Belle Fourche, South Dakota; also Sullivan 1000. Write: Fred E. Butler, Box 1832, Casper, Wyoming.

FOR SALE: 21-W in first-class condition, ready to go with complete line of 5⅝" tools, new cables, gas welder, fishing tools; mounted on 1936 Chevrolet 1½-ton, with new motor and radiator; fine new tires; only $2,500.00. Write: Dee Linn, St. Joe, Arkansas.

BUSINESS COMES TO YOU: 5-room home on approximately two acres; established business; 2 rigs: B.E. 21-W and Star side arm spudder; 4" tools, other equipment and supplies; 1000 feet pipe; 14x24 storage building; located 4 miles east of city, East 10th St. Write: C. C. Brown, Route 11, Box 297-M, Indianapolis 44, Indiana.

(Continued on Page 15)

City well at Ensign, Kansas, constructed by O. B. Johnson producing 135 g.p.m. under pump testing.

(Continued from Page 14)

FOR SALE: One 35-W Armstrong drilling rig semi-truck mounted with equipment, ready to go; in good shape. Phone or write: Perkins Well Company, St. Paul Park, Minnesota, telephone LaSalle 268.

FOR SALE: Truck mounted rotary drill, Franks 1000-ft. capacity drill, complete, tools, pipe, etc. Priced to sell. Write: Fred E. Butler, Box 1832, Casper, Wyoming.

FOR SALE: One No. 26 Cyclone drill, in good running condition with Continental 4 cylinder motor; price $1,000.00. String of 4-in. tools $250.00 extra. Write: Ralph R. Smith, Route 3, Barberton, Ohio.

WANTED: Driller to operate a Bucyrus-Erie rig, drilling holes from 5-inch to 20-inch. Have plenty of work and casing on hand. Good wages for right party. Write or telephone: Chas. D. Nolan, 1003 20th St. S. E., Cedar Rapids, Iowa, telephone 2-7644.

WANTED TO BUY: One set of 2½-in. drill jars, in good shape; also one No. 60 all steel Howell drilling rig. Write: John M. Wolf, Napoleon, N. D.

FOR SALE: One well auger mounted on 6x6 Studebaker truck, purchased new 1949, drills up to 36-in. hole, complete with 100-ft. drill rod, rig practically new; price $3,500.00. Write: Columbia Pump & Well Company, 232 Gallatin Street, N. W., Washington 11, D. C.

Cyrus ("Cy") Stevens of Findlay, Illinois, has been drilling wells since 1917. The picture shows a well being drilled for Cedric Boswell, Shelbyville, Illinois. Mr. Stevens is not only a well driller but he is a water witcher and inventor having invented and patented the Stevens and Miller Air Induction unit to prevent pressure tanks from becoming water logged.

FOR SALE: One Howell No. 60 all steel drill; shock absorber, near new power plant; trailer type on pneumatic tires. Write: Alton Cement Works, Alton, Iowa.

FOR SALE: One drilling machine all steel with swivel socket, drive clamps, drive head and tools 5 to 13 in., bailer and sand pump, jack and circle, chain tongs, fishing tools, F.W.D. truck 4 wheel drive '38 model, one International truck 12 foot steel bed '47 model; $3,000 takes all; reason for selling, too much competition with cut-throat prices; will sell all together or separately. Write: Orion Casto, Box 309, Ripley, West Virginia.

FOR SALE: One Ideco No. 6 drilling rig with 31-ft. telescoping derrick, mounted on '37 Chevrolet 1½-ton truck, drilled only seven wells; one Star drilling rig No. 40—28-ft. derrick mounted on '41 International 1½-ton truck; few strings of 4-inch tools, one string 6-in. tools, 1 string 3-in. tools, also fishing tools; one 1941 White 1½-ton truck and one 1941 ½-ton Ford Panel truck. Will sell home and business also on account of failing health. Telephone 77F14, Fulton, Indiana, or write: Richard Henderson, R. R. No. 2, Kewanna, Indiana.

FOR SALE: Used pumps, one 20 H.P. Deming pump 8-in, 300 g.p.m. at 176 TDH; one 8-in. 25 H.P. 350 g.p.m. pump at 172 TDH; and one 10-in 60 H.P. pump 750 g.p.m. at 256 TDH; all equipped with 3 phase, 220 volt, 1800 RPM, U. S. motors; discharge head and bowl assemblies; there are no columns or shafts with these pumps; all guaranteed as new. Write: Connecticut Pump Company, 59 Broadway, North Haven, Conn.

FOR SALE: For half price of new, two drill stems, 5x5 carbon steel bits; two sets drill jars; two swivel rope sockets; one set heavy drill wrenches; one derrick crane; one set wire rope clamps; one slip socket; two gasoline pump jacks engines; and other miscellaneous tools. Write: Gray Well Drilling Company, P. O. Box 181, Delafield, Wis.

FOR SALE: No. 40 Sanderson-Cyclone, less than year old, equipped with 2 - 4-in. Howell pumps for jetting; complete set of hollow rod tools; requires no alteration to handle solid tools; four wheel trailer mounted; several thousand feet of 1¼, 2, 3, and 4-in. pipe will go with rig if desired; also 1940 Dodge truck, 1½ ton, two speed axle, hydraulic hoist, new motor last August. Write: Carl B. Olsen, Medora, North Dakota.

FOR SALE: 211 feet of 5⅝" S & S casing threaded and coupled; never used. Write: Leo Lutz, Osceola, Wisconsin.

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WANTED: Two experienced drillers and also two helpers immediately. Write: T. W. VanWinkle & Son, Salem, Iowa.

WANTED TO BUY: Used 28-L or 24-L Bucyrus-Erie rig in good condition, mounted on trailer. Write Box A, c/o Edward E. Johnson, Inc., 2304 Long Ave., St. Paul 4, Minnesota.

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The Red Jacket Manufacturing Company of Davenport, Iowa, announces a new line of Multi-Stage shallow well centrifugal and deep well injector pumps and water systems.

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This new addition to the Red Jacket line is especially valuable because these pumps will operate efficiently from pumping levels down to 190 feet and maintain almost constant capacities throughout the pressure range.

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